

IN THE CLAIMS:

1. (Currently Amended) An echographic ~~Echographic~~ examination method, comprising:  
providing in which an echographic contrast medium; ~~including microbubbles, or~~  
~~generating microbubbles upon exposure to ultrasonic waves, injected~~  
injecting said echographic contrast medium into a blood vessel, said echographic  
5 contrast medium including microbubbles, or generating microbubbles upon exposure to  
ultrasonic waves, said echographic contrast medium being delivered is sent by means of the  
blood circulation to a part of a living body under investigation via blood circulation; and said  
part is struck by  
delivering an ultrasonic excitation signal at an excitation frequency ( $f_0$ ) to said part; and  
10 in which such that the microbubbles are struck by the ultrasonic excitation signal, said struck  
microbubbles generating ~~generate~~ an echo signal at an echo signal frequency, said echo signal  
frequency being different from ~~[[the]]~~ said excitation frequency, said signal being used to  
generate an image; wherein said excitation signal exerts a pressure of 30 kPa to 1 Mpa 60 kPa  
to 200 kPa on said microbubbles~~[[,]]~~ ~~[[so]]~~ such that the microbubbles emit a stable signal at  
15 one subharmonic at least of the excitation frequency; ~~[[,]]~~ said stable signal being processed to  
generate images  
generating images based on said stable signal.

2. (Canceled)

3. (Currently Amended) A method ~~Method~~ according to [[Claim]] claim 1, wherein said excitation signal is a sinusoidal signal.

4. (Currently Amended) A method ~~Method~~ according to claim 1, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

5. (Currently Amended) A method ~~Method~~ according to claim 2, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

6. (Currently Amended) A method ~~Method~~ according to claim 3, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

7. (Currently Amended) A method ~~Method~~ according to claim 1, wherein a plurality of images obtained at successive instants of time of the echographic signal, or at spatially distinct points of said part under examination, are displayed simultaneously on a screen.

8. (Currently Amended) An echographic ~~Echographic~~ examination method, comprising: in which

providing an echographic contrast medium; ~~containing microbubbles or generating~~  
microbubbles upon exposure to ultrasonic waves;

injecting said echographic contrast medium ~~injected~~ into a blood vessel[[,]] such that

said echographic contrast medium is sent by means of the blood circulation delivered to a part of a living body under investigation via blood circulation, said echographic contrast medium comprising microbubbles or generating microbubbles upon exposure to ultrasonic waves; and said part is struck by 5

10 delivering an ultrasonic excitation signal at an excitation frequency ( $f_0$ ) to said part at a frequency of 3.3 MHz, and in which such that the microbubbles struck by the ultrasonic excitation signal generate an echo signal at an echo signal frequency, said echo signal frequency being different from the excitation frequency, said signal being used to generate an image; wherein said excitation signal exerts sufficient a pressure in a range of 60 to 200 kPa on said 15 microbubbles such that said microbubbles to cause their rupture, said microbubbles generating an echographic signal being generated during the when said microbubbles rupture, said echographic signal containing a spectral distribution at the excitation frequency, said spectral distribution being at [[its]] subharmonics and at [[its]] ultraharmonics of said excitation frequency;[[.]]

20 filtering said echographic signal being filtered to extract [[the]] spectral content from [[it]] said echographic signal at at least two of said ultraharmonics and subharmonics; generating an image based on said echographic signal.

9. (Currently Amended) A method ~~Method~~ according to claim 8, wherein a plurality of images obtained at successive instants of time of the echographic signal, or at spatially distinct points of said part under examination, are displayed simultaneously on a screen.

10. (Currently Amended) An ultrasonic ~~Ultrasonic~~ method for imaging, comprising:  
introducing in which an echographic contrast medium including microbubbles into a  
portion of a body under investigation, or generating microbubbles upon exposure to ultrasonic  
waves[[.]] is introduced into a in the portion of a body under investigation; and is struck by  
5 delivering an ultrasonic excitation signal at an excitation frequency ( $f_0$ ) to said portion  
of the body such that, ~~and in which~~ the microbubbles are struck by the ultrasonic excitation  
signal, wherein ~~said struck microbubbles~~ generate an echo signal at a frequency different from  
the excitation frequency, ~~said signal being used to generate an image~~; wherein said excitation  
signal exerts a pressure in a range of 30 kPa to 1 Mpa ~~60 to 200 kPa~~ on said microbubbles[[.]]  
10 [[so]] such that the microbubbles emit a stable signal at at least one subharmonic of the  
excitation frequency; ~~said stable signal being processed to generate images~~  
processing said stable signal;  
generating images based on said processed stable signal.

11. (Currently Amended) A method ~~Method~~ according to claim 10, wherein said body  
is a living body.

12. (Currently Amended) A method ~~Method~~ according to claim 11, wherein said  
contrast medium or agent is injected into a blood vessel of said living body.

13. (Canceled)

14. (Currently Amended) A method ~~Method~~ according to [[Claim]] claim 10, wherein said excitation signal is a sinusoidal signal.

15. (Currently Amended) A method ~~Method~~ according to [[Claim]] claim 11, wherein said excitation signal is a sinusoidal signal.

16. (Currently Amended) A method ~~Method~~ according to [[Claim]] claim 12, wherein said excitation signal is a sinusoidal signal.

17. (Currently Amended) A method ~~Method~~ according to [[Claim]] claim 13, wherein said excitation signal is a sinusoidal signal.

18. (Currently Amended) A method ~~Method~~ according to claim 10, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

19. (Currently Amended) A method ~~Method~~ according to claim 13, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

20. (Currently Amended) A method ~~Method~~ according to claim 14, wherein each of said microbubbles consists of a membrane containing a gaseous medium.

21. (Currently Amended) A method ~~Method~~ according to claim 10, wherein a plurality of images obtained at successive instants of time of the echographic signal, or at spatially distinct points of said part under examination, are displayed simultaneously on a screen.

22. (Currently Amended) An ultrasonic ~~Ultrasonic~~ method for imaging, comprising:  
in which

introducing an echographic contrast medium including microbubbles, or generating microbubbles upon exposure to ultrasonic waves, ~~is introduced~~ into a portion of a body under investigation; ~~and is struck by~~

delivering an ultrasonic excitation signal at an excitation frequency ( $f_0$ ) ~~of 3.3 MHz, and~~  
in which such that the microbubbles are struck by the ultrasonic excitation signal, said struck  
microbubbles generating ~~generate~~ an echo signal at an echo signal frequency, said echo signal  
frequency being different from the excitation frequency, ~~said signal being used to generate an~~  
image; wherein said excitation signal exerts ~~sufficient~~ a pressure in a range of 60 to 200 kPa on  
said microbubbles such that said microbubbles ~~to cause their~~ rupture, wherein said microbubbles  
generate an echographic signal ~~being generated during the rupture~~ when said microbubbles are  
ruptured, said echographic signal containing a spectral distribution at the excitation frequency,  
said spectral distribution being at  $[[its]]$  subharmonics and at  $[[its]]$  ultraharmonics of said  
excitation frequency, said echographic signal being filtered  $[[to]]$  such that extract the spectral  
content is extracted from  $[[it]]$  echographic signal at at least two of said ultraharmonics and  
subharmonics;

generating images based on said echographic signal.

23. (Currently Amended) An ultrasonic ~~Ultrasonic~~ imaging method, including comprising the steps of:

[[~~-~~]] introducing ~~providing~~ a contrast medium; ~~including microbubbles; or generating microbubbles upon exposure to ultrasonic waves;~~

5 introducing said contrast medium in a portion under investigation of a body, said contrast medium comprising microbubbles, or generating microbubbles upon exposure to ultrasonic waves;

10 subjecting [[~~-~~]] ~~struck~~ said portion with an ultrasound excitation signal at an excitation signal, said microbubbles generating an echo signal at an echo signal frequency, said echo signal frequency being different from the excitation frequency;

controlling ~~wherein~~ said excitation signal ~~is controlled~~ to exert a pressure in a range of 60 to 200 kPa on said microbubbles such that the microbubbles emit a stable signal at at least one subharmonic of said excitation frequency;

generating images based on said stable signal.

24 - 25. (Canceled)

26. (Currently Amended) An ultrasonic ~~Ultrasonic~~ imaging method, including comprising the steps of:

5                    [[-]] injecting a contrast medium including microbubbles, or generating microbubbles upon exposure to ultrasonic waves in a blood vessel of a patient;

5                    subjecting [[-]] ~~struck~~ing said microbubbles with an ultrasound excitation signal at an excitation signal of 3.3 MHz, said microbubbles generating an echo signal at an echo signal frequency, said echo signal frequency being different from the excitation frequency; ~~wherein~~  
10                    controlling said excitation signal ~~is controlled~~ to exert a pressure in a range of 60 to 200 kPa on said microbubbles such that the microbubbles emit a stable signal at at least one subharmonic of said excitation frequency;

generating images based on said stable signal.

27 - 28. (Canceled)

29. (Currently Amended) An ultrasonic ~~Ultrasonic~~ imaging method, ~~including~~  
comprising the steps of:

                    [[-]] introducing a contrast medium including microbubbles, or generating microbubbles upon exposure to ultrasonic waves, in a portion under investigation of a body;

5                    subjecting [[-]] ~~struck~~ing said portion with an ultrasound excitation signal at an excitation signal, said microbubbles generating an echo signal at an echo signal frequency, said  
echo signal being different from the excitation frequency<sub>1</sub>[[;]] wherein said excitation signal exerts sufficient a pressure in a range of 60 to 200 kPa on said microbubbles ~~to cause their such~~  
that said microbubbles rupture, said microbubbles generating an echographic signal being



10 generated during the when said microbubbles rupture, said echographic signal containing a spectral distribution at the excitation frequency, said echographic signal containing said spectral distribution at ~~[[its]]~~ subharmonics and at ~~[[its]]~~ ultraharmonics of said excitation frequency, said echographic signal being filtered ~~to extract the such that~~ spectral content is extracted from ~~[[it]]~~ said echographic at at least two of said ultraharmonics and subharmonics;

15 generating images based on said echographic signal.

30. (Currently Amended) An ultrasonic ~~Ultrasonic~~ imaging method, including comprising the steps of:

~~[[ - ]]~~ injecting a contrast medium including microbubbles, or generating microbubbles upon exposure to ultrasonic waves, in a blood vessel of a patient;

5 ~~[[ - ]]~~ subjecting ~~striking~~ said microbubbles ~~[[with]]~~ to an ultrasound excitation signal at an excitation signal, said microbubbles generating an echo signal at an echo signal frequency, said echo signal frequency being different from the excitation frequency, ~~[[;]]~~ wherein said excitation signal exerts sufficient a pressure in range of 60 to 200 kPa on said microbubbles such that said microbubbles to cause their rupture, said microbubbles generating an echographic  
10 signal ~~being generated~~ during the rupture of said microbubbles, said echographic signal containing a spectral distribution at the excitation frequency, said spectral distribution being at ~~[[its]]~~ subharmonics and at ~~[[its]]~~ ultraharmonics of said excitation frequency, said echographic signal being filtered such that to extract the spectral content is extracted from ~~[[it]]~~ said echographic signal at at least two of said ultraharmonics and subharmonics;

generating images based on said echographic signal.

31. (Currently Amended) An ultrasonic imaging system for imaging the harmonic response of a structure inside a body, including the system comprising:

[[ - ]] a means for transmitting ultrasonic energy into the body at an excitation frequency of 3.3 MHz;

a contrast medium;

[[ - ]] a means responsive to said transmitted ultrasonic energy, for receiving ultrasonic echo signals, said ultrasonic echo signals being generated by microbubbles of [[ a ]] said contrast medium introduced into said body, said ultrasonic echo signals being generated at a subharmonic of said excitation frequency;

[[ - ]] a means for producing an ultrasonic image from said echo signals, [[ ; ]] wherein said excitation signal is controlled to exert a pressure in a range of 60 to 200 kPa on said microbubbles, ~~so~~ such that the microbubbles emit a stable signal at one subharmonic at least of the excitation frequency, said stable signal being processed to generate images.

32. (Canceled)

33. (Currently Amended) An ultrasonic imaging system for imaging the harmonic response of a structure inside a body, including the system comprising:

a [[ - ]] means for transmitting ultrasonic energy into the body at an excitation frequency;

a contrast medium;

5           a [[-]] means responsive to said transmitted ultrasonic energy, for receiving ultrasonic echo signals, said echo signals being generated by microbubbles of [[a]] said contrast medium introduced into said body, said echo signals being generated at a subharmonic of said excitation frequency;

10           a [[-]] means for producing an ultrasonic image from said echo signals<sub>2</sub>[[[:]] wherein said excitation signal exerts sufficient a pressure in a range of 60 to 200 kPa on said microbubbles such that said microbubbles to cause their rupture, said microbubbles generating an echographic signal being generated during the when said microbubbles rupture, said echographic signal containing a spectral distribution at the excitation frequency, said spectral distribution at [[its]] subharmonics and at [[its]] ultraharmonics of said excitation frequency, said means responsive to said transmitted ultrasonic energy including a filter, said filter extracting to extract the spectral content from [[it]] said echographic signal at at least two of said ultraharmonics and subharmonics.

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